

Goldilocks Mastectomy, Ain Shams University Hospital Initial Experience

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Abstract

Background: Goldilocks mastectomy procedure was described in 2012. This procedure uses the redundant inferior mastectomy flap tissue to construct a breast mound.

Aim of Study: To assess the feasibility of Goldilocks mastectomy procedure in breast cancer patients, and to identify the aesthetic outcomes, and the complications of the Goldilocks mastectomy.

Patients and Methods: This was a pilot prospective study, carried out at the Breast Surgery Department, Ain Shams University Hospitals. Fifteen female patients candidates for mastectomy underwent Goldilocks mastectomy.

Results: The mean age was 40.5 years old, most of them 66.66% were diagnosed with invasive ductal carcinoma. Only 60% of the patients accepted the contralateral breast mammaplasty. All resection margins were free in the postoperative paraffin section. Only one patient developed a seroma and only two patients developed minor complications, managed conservatively. Psychological and physical well-being slightly improved after the surgery. The Multidisciplinary Team ranked the procedure results between very good and excellent.

Conclusion: Goldilocks mastectomy is a feasible procedure with accepted results and low complicated rates. However, comparative multicentric studies with larger cohorts and longer follow-up periods are needed.

Key Words: Goldilocks mastectomy – Breast reconstruction – Subcutaneous mastectomy – Breast cancer – Wise pattern.

Introduction

BREAST carcinoma (BC) has been prevalent in the female population since, at least, Ancient Egypt [1]. And since 2020, breast cancer super passed lung cancer, and is now the most common cancer in females worldwide [2]. Mastectomy was the treatment of choice for decades, it evolved passing

some important milestones. In 1804, the Japanese surgeon Seishu Hanaoka performed the world's first mastectomy under general anesthesia, and in 1889, William Halsted performed the radical mastectomy, and the supra radical mastectomy was performed by Jerome Urban and Owen Wangenstein in 1925 [1]. However, a change in the strategy of management of breast cancer occurred on knowing that survival didn't improve with more aggressive surgeries. Less aggressive surgeries were described for BC like the modified radical mastectomy, simple mastectomy, lumpectomy, quadrantectomy, skin-sparing mastectomy, oncoplastic breast surgeries, nipple-sparing mastectomy, and extreme oncoplastic procedures [3-6]. Moreover, in the last two decades, dozens of trials demonstrated equivalent survival outcomes when some previously routine therapies were omitted in selected patient groups, leading to what's called surgical de-escalation [7].

Skin-sparing mastectomy was described to be an oncologically safe option for females with breast cancer, however, the strategies used for reconstruction whether using prosthetic implants or autologous tissues, each has its own problems, benefits, & drawbacks [8-11]. Common problems of breast prosthetic reconstruction are peri-implant seroma, infection, implant rupture, mechanical shearing, and implant-associated anaplastic large-cell lymphoma [12].

The old woman in Robert Southey's fairy tale 'The Story of the Three Bears' [13], which was written in 1837, was unhappy with the food until she found some food which "...was neither too hot nor too cold, but just right; and she liked it so well...". In the later versions of the story this woman was called Goldilocks, and her way of

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choosing things was called the 'Goldilocks Principle', which declines the two extremes in favor of an in-between suitable option. Based on that principle, in 2012, a combination between a skin-sparing mastectomy procedure and closure using a standard Wise pattern was described to be the Goldilocks mastectomy [14].

Aim of the work:

To assess the feasibility of Goldilocks mastectomy procedure in breast cancer patients, and to identify the aesthetic outcomes, and the complications of the Goldilocks mastectomy.

Patients and Methods

This was a pilot prospective study, carried out at the Breast Surgery Department, Ain Shams University Hospitals, in the period from March to December 2022. Female patients with macromastia or breast ptosis (2nd or 3rd degree according to Regnault's classification [15], diagnosed with breast cancer by tissue biopsy, were recruited for this study. They should have an invasive mass (stage one - three) or in-situ lesion (ductal or lobular) and were candidates for mastectomy. Patients with inflammatory breast cancer, stage four breast cancer, previous extensive breast surgeries, previous breast radiation, patients unfit for anesthesia, or patients with breast cup less than D were excluded. Approval for the study was obtained from the Research Ethics Committee (REC), General Surgery Department, Ain Shams University (IRB 00006379). The privacy of participants and confidentiality of the data was ensured throughout the process of data collection and documentation. Informed consent was signed out by all patients after a detailed explanation of the procedure. Any inquiries, concerns, or doubts were discussed with

the patient and a first-degree relative (upon the patient's request).

Complete history recording and full clinical examination were done, followed by imaging and biopsy, from breast and lymph nodes if needed. All cases were presented in the Multi-Disciplinary Team (MDT) meeting. Further workup, like breast magnetic resonance imaging (MRI), was recommended for some patients by the MDT.

On the day of surgery preoperative markings, Fig. (1), were done, to locate major landmarks, namely the infra-mammary fold, new areola location, and the boundaries of the inferior flap.

De-epithelialization of the inferior skin flap (Fig. 2) was followed by a skin-sparing mastectomy and sentinel lymph node biopsy, using the same incision (Fig. 3). Both breast and lymph nodes were sent for a frozen section. The inferior flap was placed inside the breast defect to replace the volume, and the incisions were closed. Neo-areola was created by deep skin scratches, formed using a scalpel, and then sutured (Figs. 4,5).

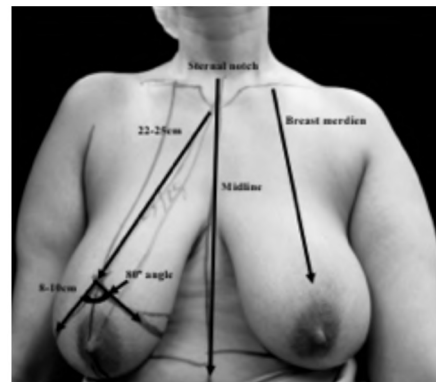


Fig. (1): Preoperative markings while the patient is standing.

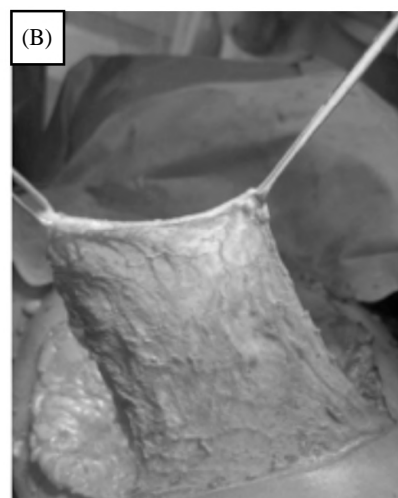
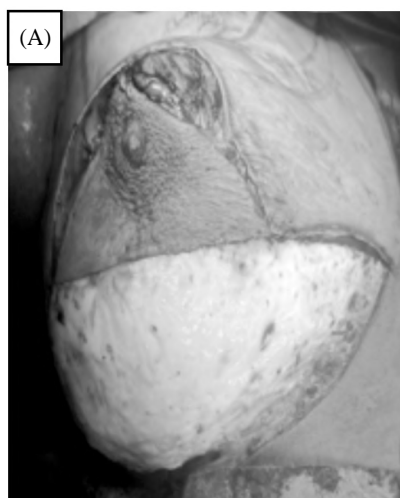


Fig. (2): (A) De-epithelialization of the skin; (B) The deepithelialized inferior mastectomy flap.

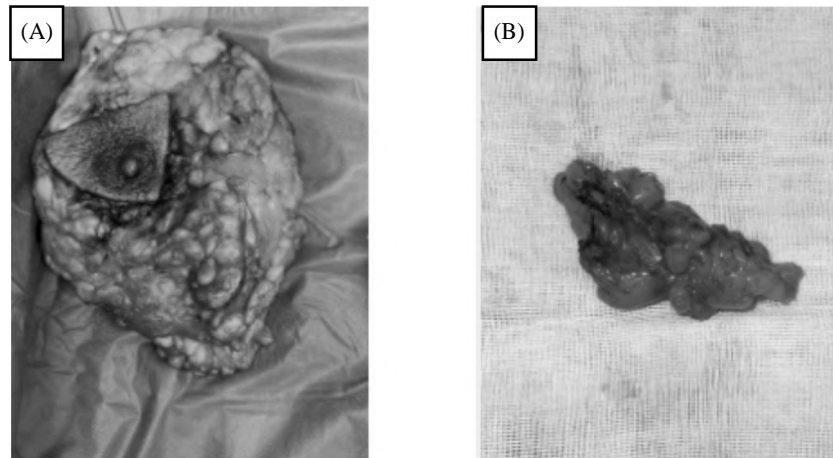


Fig. (3): (A) The breast specimen; (B) The sentinel lymph node.



Fig. (4): (A) The de-epithelialized inferior mastectomy flap; (B) Molding of the lower flap on the chest wall; (C) Maintaining the position of the flap by vicryl sutures.



Fig. (5): Intraoperative result after closure of the skin.

Patients were followed-up twice weekly for dressing until removal of the drains, then a weekly visit for a month to detect any complication. The assessment of the aesthetic outcomes was done using both the validated scoring system "BREAST-Q" and MDT evaluation. The MDT evaluation was done via a five-questions score, covering the following aspects: The overall shape of the breast,

symmetry, site and direction of the nipple, volume of the breast, and scar. Each variable may take a figure from one to five.

Collected data were de-identified and tabulated, and the statistical analysis was done using IBM SPSS Statistics for Windows, Version 23.0. (2015) Armonk, NY: IBM Corp.

Results

Fifteen eligible females with breast cancer and candidates to undergo the Goldilocks mastectomy procedure were enrolled in this study.

The mean age was 40.5 ± 7.38 years old, and the mean body mass index (BMI) was 33.1 ± 6.6 . Six patients (40%) were found to have a positive family history of breast cancer. Three patients (20%) had received neoadjuvant chemotherapy before enrollment. Four patients (26.6%) suffered from medical comorbidities, two patients (13.3%) suffered from diabetes mellitus, and 3 (20%) patients had hypertension.

Ten of the patients (66.66%) had invasive ductal carcinoma (IDC), three patients (20%) had invasive

lobular carcinoma (ILC), two patients had masses with carcinoma in-situ lesion (one was a multifocal lesion the other was multicentric) (Table 1).

Table (1): Tumor characteristics.

Histopathological results	No.	%
IDC	10	66.66
ILC	3	20.00
Insitu (multifocal)	1	6.67
Insitu (multicentric)	1	6.67

No. : Number.

IDC: Invasive ductal carcinoma.

ILC: Invasive lobular carcinoma.

Nine patients (60%) accepted contralateral breast reduction mammoplasty in the same setting to achieve symmetrization. The mean operation time was 184.6 ± 24 minutes, which ranged from 120 to 240 minutes, the mean blood loss was 95.87 ± 22.07 , and it ranged from 50ml to 150ml. None of the patients required blood transfusion, either intra or postoperative. Six cases (40%) required re-excision after margins assessment by frozen section, however, all post-operative paraffin section margins were clear. The mean hospital stay was 1.7 ± 0.49 days.

On follow-up, three cases (20%) developed complications, in the form of seroma in a single case (6.66%), hematoma in a single case (6.66%), and wound dehiscence also in a single case (6.66%), (Fig. 6).

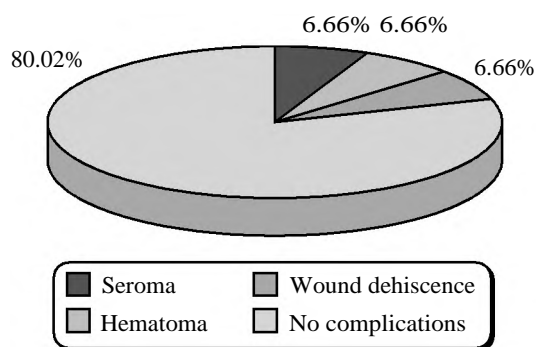


Fig. (6): Post-operative complications.

The Breast-Q questionnaire was recorded twice, before and after surgery, and the results were plotted in (Fig. 7). The mean score of all patients according to the MDT evaluation was 21 (the maximum possible score was 25) which falls between very good and excellent.

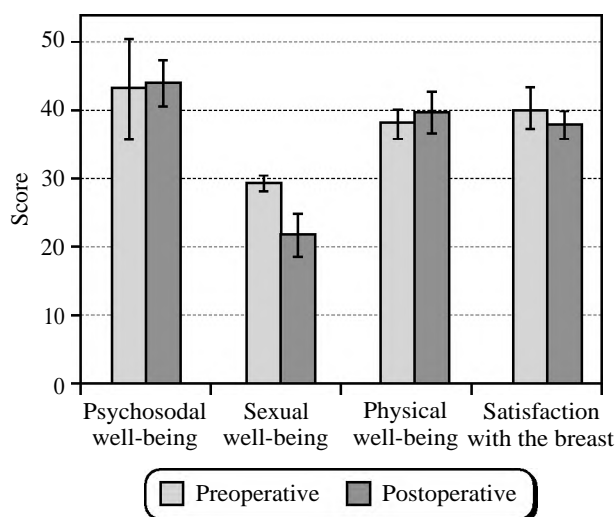


Fig. (7): Results of the BREAST-Q questionnaire.

Discussion

The Goldilocks mastectomy was first described in 2012, it's a combination of subcutaneous mastectomy and mammoplasty with completely autologous breast tissue [14]. The breast mound is formed in this procedure by the de-epithelialized residual mastectomy flap. This technique is appropriate for females who refuse or are unable to undergo traditional post-mastectomy reconstruction, particularly those with medical comorbidities or morbidly obese [16,17]. This study was evaluating the feasibility of the Goldilocks mastectomy procedure in breast cancer and to identify the aesthetic outcomes, the complications, and the quality of life after the procedure.

In the study by Chaudhry and his colleagues [18] the mean age was 55.8 years old, and it was 72 years old in the study by Ogawa and his colleagues [19]. Younger age was recorded in our study, as the mean age was 40.5 years old. While the BMI was nearly the same. Chaudhry et al. [18] reported a mean BMI of 33.7, we recorded a mean BMI of 33.1.

Three (20%) of the recruited patients received neoadjuvant chemotherapy before the procedure. This percentage was similar to what was reported by Oliver and his colleagues [20]; who reported that 26.5% of cases had received neoadjuvant chemotherapy. However, in Chaudhry's study [18] around 40% of the patients had received neoadjuvant therapy.

In this study, the indications for mastectomy were either invasive tumor or carcinoma in-situ. Other studies had used this technique with other indications, like prophylactic mastectomy for

BRCA mutation, recurrent cancer, and even inflammatory conditions [18].

Contralateral breast reduction mammoplasty was offered for all patients in this study, but only nine patients (60%) approved the procedure. Higher percentages of contralateral mammoplasties (81.1-82.1%) were reported in other studies [18,20].

Seroma formation should be considered a sequela rather than a complication after breast-conserving surgery or breast reconstruction [21,22]. In this study a single patient (6%) suffered from seroma, she needed no intervention, in other studies, the incidence of seroma was reported to be from 6.3 to 20% after the procedure [20]. Other recorded complications were hematoma (6%) and wound dehiscence (6%), the cases were mild and managed conservatively.

The breast-Q questionnaire was recorded twice for each patient, once before surgery as a baseline record, while the second was post-operative. There was no statistically significant difference between the baseline and the post-operative results, except for the sexual well-being, there was a statistically significant difference with $p < 0.001$. A similar difference in postoperative sexual well-being was reported in other studies [23-25]. Physical well-being slightly improved, this may be to the reduction of breast volume.

Conclusion:

The Goldilocks mastectomy is a feasible option for patients, candidates for mastectomy, with macromastia or breast ptosis. It has accepted results, and patient satisfaction rates, with low complicated rates. Putting in consideration that the alternative has to be a modified radical mastectomy, it would have a theoretical superiority. Comparative multicentric studies, larger cohorts, and longer follow-up periods are needed to support this hypothesis.

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استئصال الثدي بتقنية جولدى لوكس، مستشفيات جامعة عين شمس تجربة أولية

انتشر سرطان الثدي بين الإناث منذ مصر الفرعونية على الأقل . ومنذ عام ٢٠٢٠، تجاوز سرطان الثدي سرطان الرئة، وهو الآن أكثر أنواع السرطان شيوعاً بين الإناث في جميع أنحاء العالم.

تم وصف استئصال الثدي الذي يحافظ على الجلد بأنه خيار آمن من ناحية الزورام للإناث المصابات بسرطان الثدي، ومع ذلك، فإن الإستراتيجيات المستخدمة لإعادة البناء سواء باستخدام غرسات اصطناعية أو أنسجة ذاتية، لكل منها مشاكلها وفوائدها وعيوبها.

في عام ٢٠١٢، تم شرح طريقة استئصال الثدي بتقنية جولدى لوكس. تم استخدام هذه الطريقة تاريخياً لإعادة بناء الثدي لدى النساء اللواتي لم يكن مرشحات جيداً للطرق التقليدية بسبب زيادة المخاطر المرتبطة بالسمنة أو الأمراض الطبية المصاحبة، وكذلك في أولئك الذين يختارون الابتعاد عن إجراء إعادة بناء معقد والتركيز على علاج أعراضهم ببساطة قدر الإمكان لأسباب شخصية.

النساء اللاتي يعانين من ضخامة أو تدلى الثدي الحاد والمرشحات لاستئصال الثدي مع الحفاظ على الجلد هن أفضل المرشحات لهذا العلاج. يمكن استخدام هذه الطريقة لإنشاء كومة للثدي وتحضير الأنسجة لعملية جراحية إضافية إذا لم تكن إعادة بناء الثدي باستخدام غرسة صناعية فعالة.

كان الهدف من هذه الدراسة هو تقييم جدوى إجراء استئصال الثدي بتقنية جولدى لوكس في مرضى سرطان الثدي وتحديد النتائج الجمالية ومضاعفات استئصال الثدي بتقنية جولدى لوكس.

كانت هذه دراسة استطلاعية تجريبية أجريت في الفترة من فبراير ٢٠٢٢ إلى ديسمبر ٢٠٢٢ في قسم جراحة الثدي بمستشفيات جامعة عين شمس على ١٥ مريضاً موهلاً. خضع جميع المرضى إلى أخذ التاريخ الكامل، والفحص السريري، والفحوصات المخبرية، والتحقيقات الشعاعية.

أظهرت النتائج الرئيسية للدراسة أن متوسط العمر وقت العملية كان (٤٠.٥) سنة ومتوسط مؤشر كتلة الجسم وقت العملية (٣٣.١). أثناء التقييم قبل الجراحة، وجد أن ستة مرضى (٤٠٪) لديهم تاريخ عائلي إيجابي وثلاثة مرضى (٢٠٪) قد تلقوا العلاج الكيميائي المساعد الجديد.

كشفت تصوير الثدي وفحص الأنسجة المرضية عن إصابة عشرة مرضى (٦٦.٦٦٪) بسرطان الأفتنية الغازية، ووجد أن ثلاثة مرضى (٢٠٪) مصابين بسرطان الفصيص الغازي، ووجد أن مريض واحد (٦.٦٦٪) مصاب بسرطان القنوات متعدد البؤر. تم العثور على سرطان في الموقع ومريض واحد (٦.٦٦٪) لديه سرطان متعدد المراكز في الموقع.

كان معدل المضاعفات الكلى ٢٠٪ (المصل = حالة واحدة، ورم دموي = حالة واحدة، تفرز الجرح = حالة واحدة). كان هناك فرق كبير بين استبيانات الثدي قبل الجراحة وبعد الجراحة فيما يتعلق بالرفاهية الجنسية ($p < 0.001$).

بناءً على نتائجنا، نوصي بإجراء مزيد من الدراسات على المرضى الأكبر حجماً وفترة المتابعة الأطول للتأكيد على استنتاجنا.